

Wyoming Wildlife Crossing Scan Tour

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On June 30, 2015, UDOT and UDWR met with Wyoming DOT and Wyoming Game and Fish to tour their new wildlife crossings. The almost \$10 million project was substantially complete in October of 2012. The project constructed 6 underpasses and 2 overpasses and put in wildlife fence and escape ramps over a 12-mile section of US 189/191, west of Pinedale, Wyoming. US



189/191 cross a large migration path of mule deer and pronghorn antelope. Over the past 20 years the traffic in the area has increased and so has the wildlife-vehicle collisions. In 2010, the state released this project to reduce the collisions.

Since construction, there have been 85% fewer wildlife-vehicle collisions and the structures have been monitored to see their effectiveness. From October 1, 2012 through May 14, 2015, the structures combined have seen 85,220 crossings (74% mule deer and 26% pronghorn). Most pronghorn (80%) seem to prefer the overpass structures and most mule deer (90%) prefer the underpass crossings.

Overpasses

The overpass at Trappers Point is a 152' wide arch structure. Contech designed the arches and Old Castle precast the pieces. During multiple 15 minute closures, two cranes swung the half arch precast sections into place over the US 191. The pieces were the bolted together. It took about a week to place all the arch pieces. 8' high berms we added on each side of the arch to limit the animal's view of vehicles on the roadway below. Trappers Point also has a camera so that the public can



Figure 1 -1 Trappers Point Overpass looking SB on US 191

see the wildlife cross the structure.

You can see the live feed from the camera at

https://cameras.liveviewtech.com/network_cameras/public_live_cameras_video/1387?url=network_cameras/public_live_cameras_video/1387.

There also is a YouTube video about the Trappers Point overpass at

<https://www.youtube.com/watch?v=FjU44eVYJis>.

The trappers point location was selected for the overpass due to the major pronghorn migratory path that crossed in that location. Designers had hoped to use some hills next to the roadway to allow the pronghorn to see the path across the structure. That wasn't possible since some archeological sites are in the area. Instead the overpass was built with a large hump of the structure in the middle. Since this was one of the first wildlife

crossings for pronghorns, there weren't a lot of design criteria to go on. The pronghorn do use the structure as can be seen in a report prepared for Wyoming DOT in Appendix B.

Hunting is restricted in the immediate area of the crossing structures and is specific to each crossing site.

The BLM has protected the land on either side of Trappers Point crossing to allow for the pronghorn's and mule deer's migratory path.

The overpasses cost approximately \$1.7 million each. A lot of fill was needed at the Trappers Point location in order to have slopes that would be more welcoming to the pronghorn.



Figure 1-2 Trappers Point Overpass

Underpasses



Figure 2-1 Underpass #5 US 191

The underpass structures are 70 foot long, 43 foot wide, simple spans made with weathering steel rolled I-beams. There are 6 underpasses constructed on the project and all were designed the same to save money. They also were able to reuse the construction forms on each of the bridges.

The underpasses cost about \$350 thousand each.



Figure 2-2 Underpass #5 Weathering steel rolled I-beams

Weathering steel was used for the girders which reduces the maintenance on the girders since there isn't paint to maintain. The stay in place forms were used to reduce forming on the underside of the deck. The corrugations of the stay in place forms were filled with foam prior to pouring the deck to reduce the amount of concrete in the deck.

The project placed wildlife escape ramps every $\frac{1}{4}$ to $\frac{1}{2}$ miles in the 8' wildlife fence sections. In Figure 2-3, WYDOT allowed additional wildlife escape ramp at the wingwalls of the bridges. Wildlife can jump down at the wingwalls but not back up.



Figure 2-3 Underpass #5, Straight section of wing wall used as another wildlife escape ramp

Lessons Learned

UDOT and UDWR came away with a list of lesson learned. We were also able to share some successes that we have had with reducing wildlife-vehicle collisions. A partnership was developed that will benefit both states.



Figure 3-1 Double Cattle Guard

WYDOT pointed out to us that deer are getting around the ends of the double cattle guards by jumping over the angled ends sections and landing in the flat area between the angled end sections. They discussed wanting to make a custom angled end section that wouldn't have the gap between the two angled end sections. Or another possible solution was to bring the fence right up to the cattle guard and not use the angled end sections.

We will stay in touch with WYDOT and monitor this issue.

WYDOT mentioned that they have had a little bit a trouble at some locations of large deer jumping in and out of the ROW at the escape ramps. They don't have a standard drawing for their wildlife escape ramps. In Figure 3-1, WYDOT's wildlife escape ramps resemble UDOT's wildlife escape ramps STD DWG FG 4A. We didn't visit the specific sites where the deer are jumping in and out from the wildlife escape ramps.



Figure 3-2 Wildlife Escape Ramp at Trappers Point

WYDOT pointed out that in one section there was a subdivision and stores right off of their ROW. It would have been very costly to have double cattle guards and fence breaks at each property. Instead, WYDOT acquired easements and pushed the Deer Fence to the back of these properties. This saved a lot of money.

WYDOT shared with us that during the construction of the overpasses, their prime built the walls but the subcontractor backfilled them. This relationship caused a lot of conflict with each pointing fingers at each other.

Benefits from the trip

1) Tom Hart with WYDOT said he would discuss with their people the possibility of WYDOT being on a planning committee if UDOT does decide to make a bid for ICOET in 2017. He will be at ICOET this year. He also knows USFWS people in WY who are highly interested in holding ICOET in our area. If UDOT does submit a bid for the 2017 ICOET conference region wide support will be important. WY could be a valuable participant in reviewing their WVC experiences.

2) Sage Grouse adaption to the wildlife fencing:

Initially the birds had trouble with the mesh wire wildlife fence that has small net at the bottom and larger net up higher. Birds would fly into the ROW then when they tried to walk out the chicks would walk through the small net, but the adults could not pass, and the adults could not fly up the fence vertically. Sage Grouse mortality increased on the highway. Bricks were placed

under the fence in places to allow gaps for birds to pass below the fence, although this increases the risk of deer and pronghorn getting under the fence.

While WY G&F now recommends that larger mesh should be used at the bottom of the fence with smaller mesh up higher, it appears that the sage grouse have adapted to the newly fenced project. They seem to be using the crossings and to be flying over the highway rather than walking across it. Sage grouse highway mortality may be less now than prior to the project. The birds have adapted just as ungulates have adapted to identify highway crossing opportunities.

3) The live web video at the Trappers Point Overpass serves to increase public awareness and enthusiasm for wildlife crossing projects. This project has increased public education and public involvement in implementing other WVC reduction projects.

4) The wildlife fence was placed behind a large number of residences along US-191 to reduce all of these accesses (expensive double cattle guards) that would have otherwise been needed through the wildlife fence. Rather than having to deal with a large number of property owners, this was accomplished by placing the wildlife fence at the back of the highway fringe residential properties so that fence ROW considerations were handled with one rancher and the BLM.

5) The approximately 150-ft wide overpasses were constructed extra wide because there was no prior experience with antelope overpasses and they wanted to make sure these would work. Somewhat narrower overpasses may also work successfully for antelope.

6) One reason that deer are mostly using the underpasses is that these are located in their traditional migratory routes.

7) The underpasses are likewise high end crossings consisting of 70-ft span bridges with a 30-ft flat bottom in the center and side slopes to the bridge abutments on each side. These elaborate underpasses do not appear to hinder deer movement and are being used by some antelope. It will be of value to see what the passage rate is for deer and antelope at these underpasses when a final project report is prepared in the summer or fall of 2015. It is assumed that 70-ft bridges were used rather than the US-30 Nugget Canyon type box culverts to be able to achieve higher use by antelope.

8) Much of the breaching of the wildlife fencing project by ungulates is at the double cattle guards where animals are either jumping into the concrete landing pad between the two cattle

guards, or are jumping through the wings and the ends. An improved single wing across both cattle guards is anticipated to be implemented.

9) The overpasses are covered with minimum of 3-ft of select and soil cover above the concrete arches is a good amount. Part of the reason is to allow for increased soil moisture to sustain vegetation.

Appendix A

Wyoming DOT's Construction Information

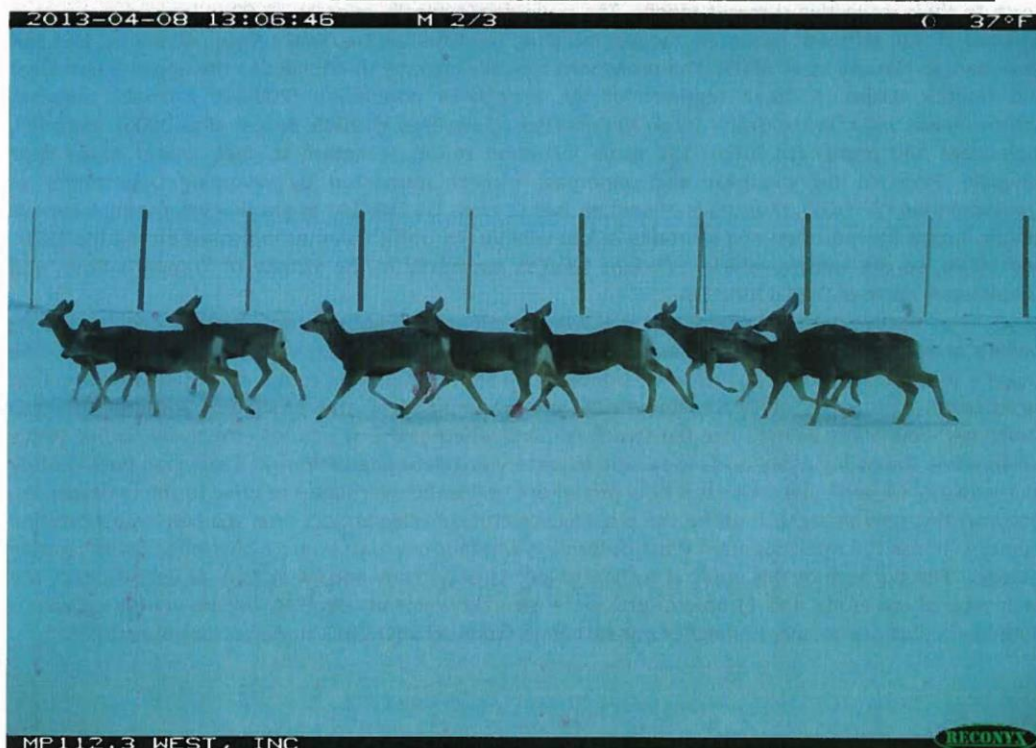
1. Intent of the project
 - a. To protect the travelling public through the migration corridor while allowing the migrating animals to follow their traditional migration routes
2. Design Issues
 - a. Much of the design was performed by Valley West Engineering in Jackson
 - b. Original proposed design extended all the way to the rim.
 - i. Trimmed due to cost
 - c. Location selection
 - i. Needed to closely resemble the migration routes
3. Funding Provided
 - a. Applied for TIGER funds, but did not receive
 - b. Ended up being state funded, although it does have a NH designation
4. Letting Date
 - a. Advertised 11/10/2010, let on 12/08/2010, and Awarded 12/09/2010
5. Completion Date
 - a. Substantially complete on 10/01/2012
6. Engineer's Estimate
 - a. \$13,145,830.20
7. Final Cost
 - a. Approximately \$9,750,000.00
8. Challenges in Building
 - a. Constructing detours and underpasses first, in order to use excess materials from these locations to place as fill
 - i. Detours North of Daniel were used for Boroff Overpass fill, detours east were used for Trapper's Point.
 - b. Sequencing the construction
9. Supplier/Construction Issues
 - a. Cattle Guards
 - i. Installed with defective concrete
 - ii. Animals cross at the wings, recommend modification to make fence abut cattle guards
 - iii. Maybe gates at all cattle guards on private- hard for deer to jump gate and cattle guard?
 - b. Gates
 - i. Heavy, hard to swing, required grading at many locations, had trouble finding acceptable latches.
 - ii. Feel as though a gate from each side that meets in the center will place less stress on the posts on each side, similar to Nugget Canyon gates
 - c. Overpasses
 - i. Contractor design-build system

1. Contech designed arches, Old Castle built
 2. Reinforced Earth designed retaining walls, Reiman built
 - a. Required Contract Amendment as Reiman is not a certified precaster
 - ii. Build- Reiman performed installation, sub performed earthwork
 1. Arches were set and could hold themselves
 2. Setting retaining walls had issues with the 2 contractors working on same area at same time
 - a. Prime's decision, but would avoid if possible
 - iii. Cost per approx \$1,700,000.00 for arch culvert and retaining walls
 - d. Underpasses
 - i. Simple span bridge designed by the bridge program
 1. All uniform, simplified construction
 - ii. Cost per approx \$350,000.00
 - e. Fence
 - i. Subcontractor had difficulty installing posts
 1. Was reluctant to using a method that did not damage posts
 2. Caused the sub to replace a substantial amount of posts
10. Working with other Agencies
- a. Worked with G&F to make sure before crossings were completed, that the animals still were able to migrate across the roadway.
 - b. Project was sequenced to allow migrating animals to continue along existing paths during the construction
11. Public Perception/Involvement.
- a. Difficult to begin, lots of negative comments from local residents
 - b. Lots of positive comments from those involved with wildlife conservation, hunters, outdoors people, nature enthusiasts
12. Follow Up Monitoring
- a. WEST-inc monitored locations
 - i. Table 1. Summary of mule deer (MD) and pronghorn (Prong) counts at each crossing structure along US 191, October 1, 2012 through May 14, 2015.

	MD East	MD West	MD North	MD South	MD All	Prong East	Prong West	Prong North	Prong South	Prong All	Totals
Boroff	2,210	2,600	0	0	4,810	1,414	1,060	0	0	2,474	7,284
Bridge 1	1,679	1,213	0	0	2,892	58	67	0	0	125	3,017
Bridge 2	1,388	1,410	0	0	2,798	53	83	0	0	136	2,934
Bridge 3	5,733	3,862	0	0	9,595	432	395	0	0	827	10,422
Bridge 4	0	0	924	817	1,741	0	0	1	1	2	1,743
Bridge 5	0	0	11,310	12,389	23,699	0	0	597	52	649	24,348
Bridge 6	0	0	3,547	2,822	6,369	0	0	451	349	800	7,169

Appendix B

Trapper's Point Wildlife Crossing Study 2013 Interim Report



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NATURAL RESOURCES ♦ SCIENTIFIC SOLUTIONS

OVERVIEW

Every spring, thousands of mule deer and pronghorn migrate from winter ranges near Pinedale, north to their respective summer ranges. The mule deer typically migrate 30-60 miles and summer in portions of four different mountain ranges, including the Gros Ventre, Snake River, Wyoming, and Salt River Ranges (Sawyer et al. 2005). The pronghorn typically migrate 10-40 miles to the upper Green River and Hoback Basins. A small segment of the pronghorn population (200-300 animals) migrates approximately 100 miles to Grand Teton National Park (Sawyer et al. 2005, Berger et al. 2006). Each fall, mule deer and pronghorn follow the same migration routes to return to their winter range near Pinedale. Prior to the overpass and underpass project completed by Wyoming Department of Transportation (WYDOT), thousands of animals had to cross US 189/191 at grade-level, posing a serious driving hazard for motorists and mortality risk to wildlife. As traffic volumes increased during the 1990s and 2000s, so did wildlife-vehicle collisions (WVCs), especially in the vicinity of Trapper's Point and immediately north of Daniel Junction.

To improve motorist safety and maintain functional migration routes, WYDOT constructed six wildlife underpasses and two overpasses in 2012 along a 12-mile stretch of US 189/191 (Fig.1). The location of these structures closely corresponded with known migration routes and road segments that experienced high levels of WVCs. Knowledge of how mule deer and pronghorn respond to these structures, how many animals use the structures, and whether the structures effectively reduce WVCs will improve the ability of agencies to sustain migratory ungulate populations and maintain public safety on roadways. Of particular interest is how pronghorn utilize the overpasses relative to the underpasses. Documenting how pronghorn utilize the crossing structures in this project area will help transportation agencies across the Intermountain West determine whether overpasses are a cost-effective mitigation strategy. The purpose of this study is to determine: 1) how many and what time of year animals use each type of structure, and 2) how effective the structures are at reducing wildlife-vehicle collisions. Here, we report preliminary findings of animal counts from October 2012 through December 2013.

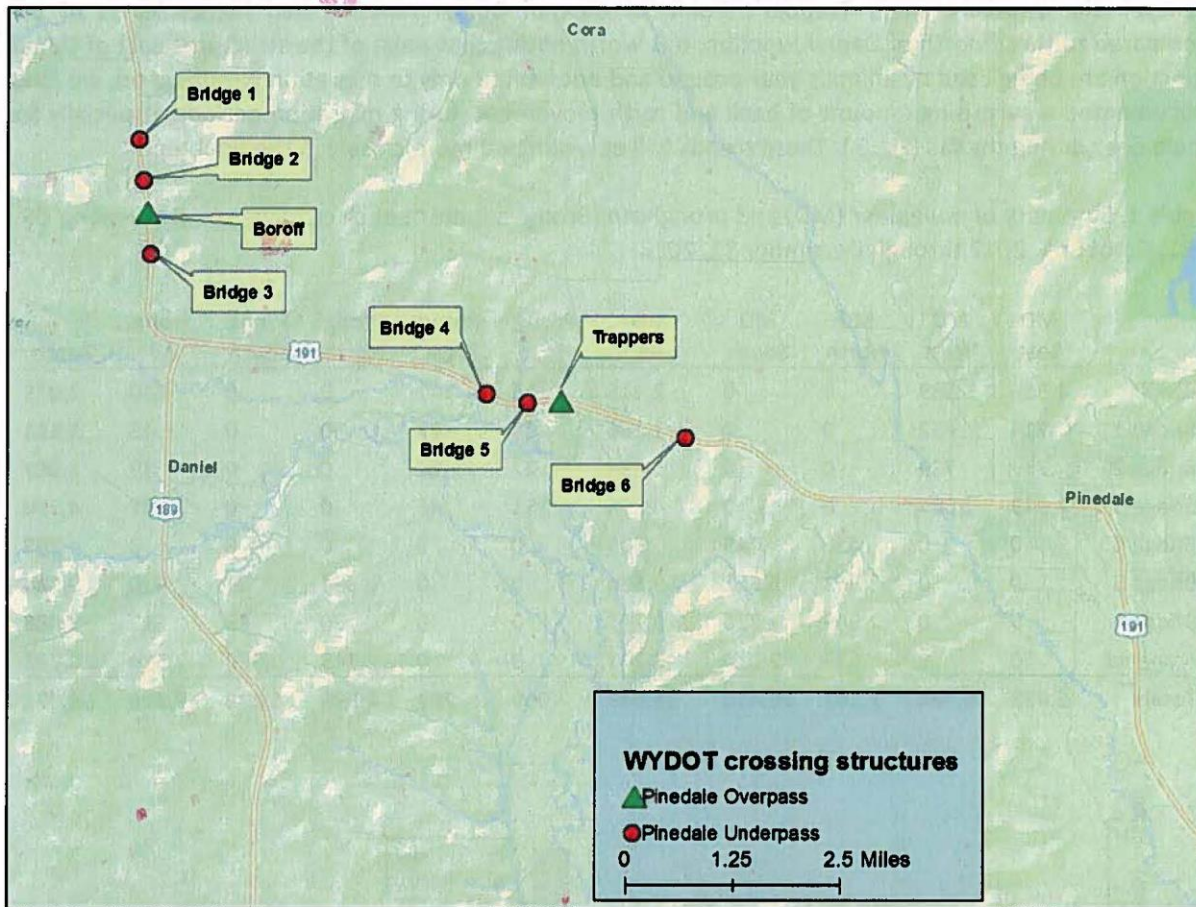


Figure 1. Approximate location of six underpasses and two overpasses constructed in a 12-mile section of US 189/191, west of Pinedale, Wyoming.

METHODS

Similar to Nugget Canyon, we used motion-sensor cameras to count the number of animals that used each crossing structure (Sawyer et al. 2012). Due to construction activities, cameras were not set up until September 27, 2012, after some pronghorn had already crossed the US 191.

RESULTS

October 2012 – December 2013

Between October 1 and December 31, 2013 we documented a minimum of 36,071 mule deer and pronghorn move through the new crossing structures along US 191 (Table 1; Photos 1-3). Of the 36,071 animals, 9,228 (26%) were pronghorn and 26,843 (74%) were mule deer. Most (80%) mule deer moved through underpasses, whereas most (90%) pronghorn preferred the overpasses. Crossing structures received differential levels of use (Fig. 2), but we caution that ongoing construction activities (e.g., earthwork, fencing, etc.) and livestock containment (i.e., closed gates) may have influenced animal use at several locations. Nonetheless, Bridges #3 and #5 were more heavily used than the other underpasses. Similarly, the overpass at Trapper's Point received more use than the Boroff overpass. In

general, the structures near Trapper's Point, or east of Daniel Junction had higher levels of use compared to those north of Daniel Junction. It is worth noting that most of the structures east of Daniel Junction are being used by animals year-around and not limited only to migration periods. And, we have documented a surprising amount of back and forth movement during migration periods, especially for mule deer during the fall (Fig. 3). These trends will be examined more closely in the final report.

Table 1. Summary of mule deer (MD) and pronghorn (Prong) counts at each crossing structure along US 191, October 1, 2012 through December 31, 2013.

	MD East	MD West	MD North	MD South	MD All	Prong East	Prong West	Prong North	Prong South	Prong All	Totals
Boroff	1,516	599	0	0	2,115	713	147	0	0	860	2,975
Bridge 1	714	452	0	0	1,166	18	27	0	0	45	1,211
Bridge 2	759	739	0	0	1,498	27	62	0	0	89	1,587
Bridge 3	2,949	1,604	0	0	4,553	151	46	0	0	197	4,750
Bridge 4	0	0	456	449	905	0	0	0	0	0	905
Bridge 5	0	0	3,963	5,621	9,584	0	0	384	26	410	9,994
Bridge 6	0	0	2,049	1,726	3,775	0	0	70	43	113	3,888
Trappers	0	0	633	2,614	3,247	0	0	2,145	5,369	7,514	10,761
Totals	5,938	3,394	7,101	10,410	26,843	909	282	2,599	5,438	9,228	36,071

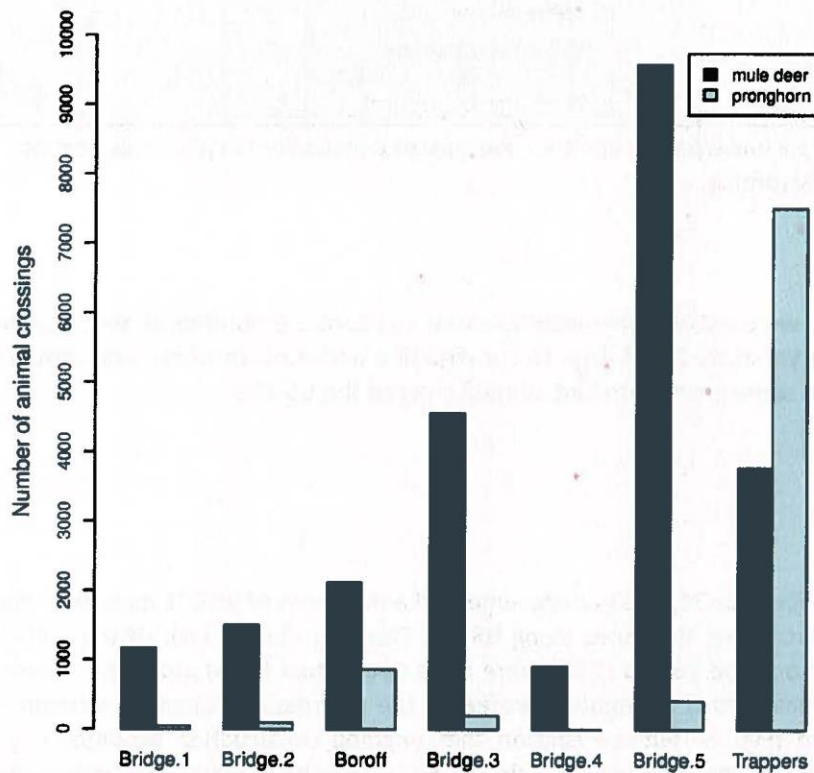


Figure 2. Number of mule deer and pronghorn crossings at each structure, October 1, 2012 through December 31, 2013.

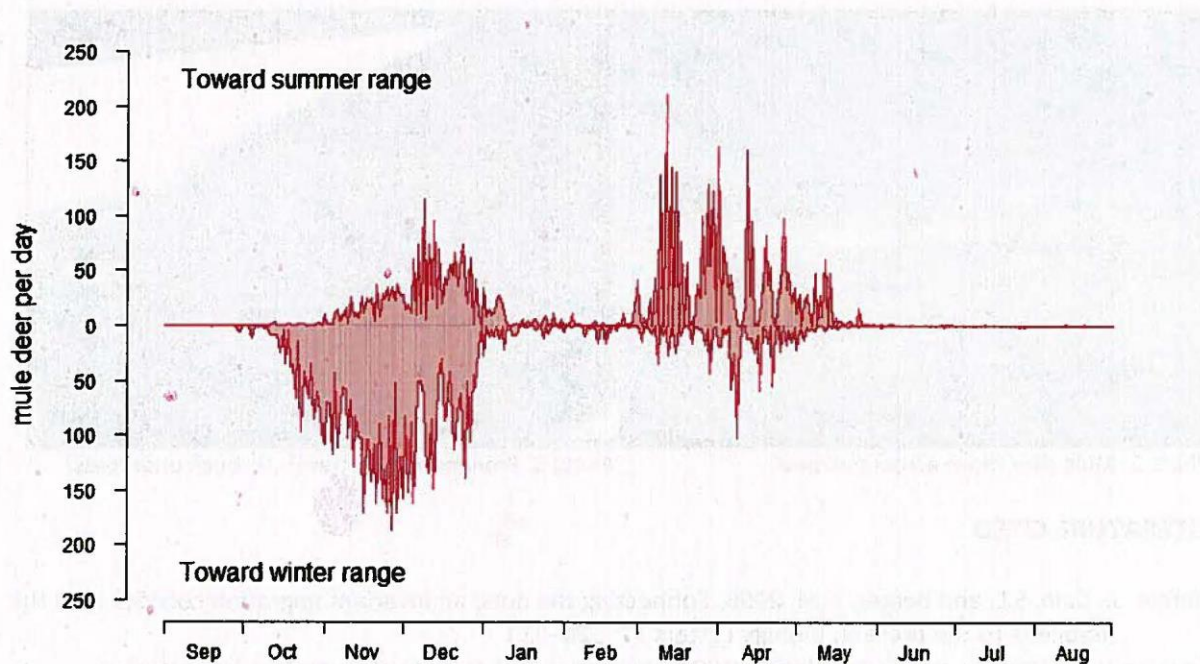


Figure 3. Average number of mule deer crossings by month and direction, October 1, 2012 through December 31, 2013.

WORK PLAN FOR 2014-15

For the past two years, some of the crossing structures were used the entire winter. This was unexpected, but we kept at least one camera operating on each structure to document winter use. Because structures are also receiving some level of summer use, we will continue to monitor through the summer months. Wildlife-vehicle collision (WVC) data is being collected and organized for analysis in final report. Structures will be monitored through the spring of 2015 and a final report prepared in the summer or fall of 2015.



Photo 1. Pronghorn move across Trapper's Point overpass (photo Joe Riis).



Photo 2. Mule deer move across overpass.



Photo 3. Pronghorn buck travels through underpass.

LITERATURE CITED

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- Sawyer, H., C. LeBeau, and T. Hart. 2012. Mitigating roadway impacts to migratory ungulates – a case study with underpasses and continuous fencing. *Wildlife Society Bulletin* 36:492-498.

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Bridge 6	0	0	3,547	2,822	6,369	0	0	451	349	800	7,169
Trappers	0	0	1,955	6,124	8,079	0	0	7,534	12,690	20,224	28,303
Totals	11,010	9,085	17,736	22,152	59,983	1,957	1,605	8,583	13,092	25,237	85,220

